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WEGMAN, HESSLER & VANDERBURG  
6055 ROCKSIDE WOODS BOULEVARD  
SUITE 200  
CLEVELAND, OH 44131

EXAMINER

VERBITSKY, GAIL KAPLAN

ART UNIT

PAPER NUMBER

2859

DATE MAILED: 01/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/717,154

Applicant(s)

XIAO ET AL.

Examiner

Gail Verbitsky

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 25 October 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 3-36 is/are pending in the application.
- 4a) Of the above claim(s) 1 and 2 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 3-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☒ Claim(s) 1 and 2 are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>02/13/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 5-11, 14-15 are objected to because of the following informalities:

Claims 5-8: Perhaps applicant should insert –scrubbing of— or scraping of— before “said reference surface” in line 1 of claims 5-8 in order to clearly describe the invention.

Claim 14: “tube” in line 2 lacks antecedent basis.

Claims 9-10: Perhaps applicant should replace “provided by” in line 1 with –connected to--.

Claims 11, 15: Perhaps applicant should replace “provided” in line 1 with --cleansed--. Is this proper interpretation of the invention? Furthermore, please note, that in the rejection on the merits, the examiner considers that the reference surface is cleansed. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO43762A1 [hereinafter WO] in view of Holmes et al. (U.S. 4138878) [hereinafter WO].

WO discloses a device and method for measuring a differential heat flux related to a buildup formation/ fouling/ deposit deposition on a surface which is positioned in a fluid, comprising a first heat flux sensing surface (first heat flux sensor) 4 and a second

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heat flux sensing surface (second heat flux sensor) 6, measuring a heat flow/ flux circulating between the surfaces (differential heat flux), detecting variations representative a material formation/ fouling on the surface (fouling surface) 4 while said surface is in contact with the fluid. This would imply that, the second surface 6, which is not subjected to the fluid, is a reference transfer surface. WO teaches in Fig. 3 an evaluation circuit comprising a calculating module 19 wherein the signal indicative/ representative of the heat flux is carried to, the signal is calculated and recorded, then, the signal representative of the heat flux is displayed on an indicator/ display 23.

For claim 4: it is inherent, that the heat flux circulating between the surfaces would be determined as a difference between the heat fluxes on each surface, such as  $\Delta Q = Q_1 - Q_2$ , or  $Q_1 - 1 \times Q_2$ , or  $Q_1 - C \times Q_2$ , wherein, it can be considered that  $C = 1$ .

For claims 9-10: there is an electronics which is capable to keep the temperature difference (and thus, the heat flow/ flux) is maintained constant between the reference surface 6 and the fluid.

For claim 15: since the second surface 4 is not exposed to the fluid, it is a non-fouling fluid surface.

The method steps will be met during the normal operation of the device stated above.

4. Claims 3-4, 9-10, 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holmes.

Holmes discloses in Figs. 2-9 a device and a method in the field of applicant's endeavor. The device comprising providing a heat transfer reference surface/ element 68, a test/ fouling surface 70 to be immersed in a fluid environment. A meter 156 reads

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the difference in temperatures which is representation of a heat flow/ flux between the surfaces and a deposit deposition/ fouling. During the foulant period, the reference surface stays at a temperature of an ambient fluid (at constant temperature and heat flux), and thus, is not fouled. Data representative of a heat flux between the surfaces is determined by  $Q_t - Q_r$  (col. 18, line 10), or (when modified by the Examiner)  $Q_t - 1 \times Q_r$ , or  $Q_t - C \times Q_r$ , wherein, it can be considered that  $C=1$ .

Holmes states that prior to measurements, the test surface is being cleaned (col. 18, lines 67-68). Also, Holmes states, that the meter can be calibrated in degrees of temperature, or by watts per square cm (heat flux density) or in thermal resistivity (col. 24, lines 65-68, col. 25; lines 1-2).

The temperature difference is measured by thermocouples attached to the surfaces.

Holmes does not explicitly stat that there is a pair of heat flux sensors. However, A) the fact that Holmes states, that the angular displacement of an output shaft of motor 310 indicates the difference in heat flux required to maintain the temperature difference at the test and the reference surfaces equal (Fig. 13 and col. 25, lines 41-61), would imply, that, by using the thermocouples, the heat flux could be obtained, furthermore, this would imply, that, in a broad sense, the thermocouples are acting as a pair of heat flux sensors.

B) also, it is very well known in the art, that thermocouples/ thermopiles (pair of thermocouples or more) could be used as heat flux/ flow sensors.

The method steps will be met during the normal operation of the device stated above.

5. Claims 5-8 and 11-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holmes in view of French (U.S. 6575662).

Holmes discloses the device/ method, as stated above in paragraph 4.

Although Holmes teaches that both surfaces should be cleaned and the foulant removed before the test, Holmes does not explicitly teach to use a mechanical brushing to remove foulant.

French teaches that foulant could be removed by using a mechanical brushing or sonic or chemical cleansing procedures.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a mechanical brushing to clean the reference surface (and the transfer surface) before the test, as taught by French, so as to provide a clean reference surface ensuring more accurate results of measurements by comparing the heat transfer surface to a foulant free surface.

With respect to claims 11-18: the use of the particular fluid/ material to clean the reference surface, i.e., non-fouling deionized water, synthetic cooling fluid, combination of the fluid exiting the fouling tube and antifouling chemicals, as stated in claims 11-18, absent any criticality, is only considered to be the "optimum" fluid that a person having ordinary skill in the art at the time the invention was made using routine experimentation would have found obvious to provide for cleansing the reference surface of Holmes since it has been held to be a matter of obvious design choice and within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use of the invention. In re Leshin, 125 USPQ 416.

The method steps will be met during the normal operation of the device stated above.

6. Claims 19-20, 25-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO in view of Hays et al. (U.S.5855791) [hereinafter Hays].

WO discloses the device/ method as stated above in paragraph 3.

WO does not explicitly teach a microprocessor, and the remaining limitations of claims 19-20 and 25-27.

Hays teaches a device in the field of applicant's endeavor wherein a microprocessor is used to determine a fouling.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the calculating module, disclosed by WO, with the microprocessor, as taught by Hays, so as to provide more accurate results by using more accurate electronic evaluating device.

7. Claims 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holmes and French as applied to claims 5-8 above in further in view of Hays.

Holmes and French disclose the device/ method as stated above in paragraph

5.

They do not explicitly teach the limitations of claims 21-24.

Hays teaches a device in the field of applicant's endeavor wherein a microprocessor is used to determine a fouling.

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Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the meter, disclosed by Holmes and French, with the microprocessor, as taught by Hays, so as to provide more accurate results by using more accurate electronic evaluating device.

The method steps will be met during the normal operation of the device stated above.

8. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Holmes in view of Diller et al. (U.S. 4779994) [hereinafter Diller].

Holmes discloses the device/ method as stated above in paragraph 4.

Holmes does not explicitly teach that the heat flux sensors are thin film heat flux sensors, as stated in claim 35.

Diller discloses a device in the field of applicant's endeavor, wherein the heat flux sensor is a thin film heat flux sensor applied to a surface of interest.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to the sensors, disclosed by Holmes and French, with the thin film heat flux sensors, as taught by Diller, so as to make the sensor of a lesser size and easily attachable to the surface of interest for more accurate results of measurements.

The method steps will be met during the normal operation of the device stated above.

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art cited in the PTO-892 and not mentioned above disclose related devices and methods.



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***Pompei (U.S. 6219573) teaches that a thermopile (couple or more thermocouples) could be used for measuring heat flux).***

Any inquiry concerning this communication should be directed to the Examiner Verbitsky who can be reached at (571) 272-2253 Monday through Friday 8:00 to 4:00 ET.

GKV

Gail Verbitsky

Primary Patent Examiner, TC 2800



January 03, 2004